

REMARKS

Claims 1-31 are pending. Claims 1-19 are withdrawn from consideration and claims 20-31 are under consideration. The Office Action rejected claims 20-31. Claims 20, 21, 25, and 30 have been amended herein. New claims 32-43 have been added.

Claims 20 and 21 have been amended to improve the readability of the claims and not for patentability reasons. Specifically, the matter recited in these claims has been split into two additional independent claims, *i.e.*, new claims 32 and 33, respectively. Further, as a result of adding new claims 32 and 33, new dependent claims 34-43 have also been added. Support for these new dependent claims can be found in claims 22-31.

Claims 25 and 30 have been amended by adding the sequence identification number of the lyase referred to in the claims. Support for this amendment can be found at Figure 1 (*see* Figure 1G) and in the specification at, *inter alia*, page 10, lines 3-7.

No new matter is believed to be added by these amendments; therefore, Applicants respectfully request that examination continue on the claims as amended herewith.

Response to Objections:

The Office Action objected to the description under 37 C.F.R. §§ 1.821-1.825, alleging that Figures 1A-G contained several amino acid sequences that are not identified by a sequence identification number. Applicants would like to point out that Figure 1 shows the sequences and similarities of various amino acid sequences, for example, AOS-Flax, AOS-Guyaule, AOS-Arabi, etc. These sequences span Figure 1 in its entirety; that is, they begin at Figure 1A and end at Figure 1G. At the very end of Figure 1, *i.e.*, Figure 1G, the sequence identification numbers are provide for each sequence shown in Figure 1. Accordingly, Applicants respectfully submit that the amino acid sequences of Figure 1 are properly identified by sequence identification number and request that this objection be withdrawn.

The Office Action also objected to claims 25 and 30 under 37 C.F.R. §§ 1.821-1.825 because they allegedly refer to specific polypeptide sequences without identifying the sequences with a sequence identification number. Claims 25 and 30 have been amended to specifically recite the sequence identification number of the amino acid sequence referred to therein. Accordingly, Applicants respectfully request that this objection be withdrawn.

As for claims 20 and 21, the Office Action objected to these claims under 37 C.F.R. § 1.75(d)(1) because the claims allegedly recite an improper Markush group. Applicants respectfully disagree with this assessment. Markush group language is not used in these claims and thus no Markush groups are believed to be present. Nevertheless, to facilitate prosecution of this application, the matter recited in claims 20 and 21 has been split into separate claims. New claim 32 and 33 have been added as suggested by the Examiner. Applicants believe this amendment overcomes the rejection.

The Office Action objected to claims 20 and 21 because the steps recited in the claims were not designated in sequential, alphabetic order. These claims have been amended to refer to steps (a), (b), (c), and (d). Applicants accordingly request withdrawal of this objection.

Response to Rejections:

As an initial matter, Applicants would like to point out that the claims currently under consideration recite methods of using hydroperoxide lyases. The USPTO has already acknowledged in US Patent 6,271,018 that the nucleic acids encoding such lyases are patentable, *e.g.*, they are novel, unobvious, enabled, and adequately supported by the description. It therefore follows that in the present claims the recited hydroperoxide lyases are also novel, unobvious, enabled, and adequately supported by the description.

Rejection under 35U.S.C. § 112, ¶ 1

The Office Action rejected claims 20-24 and 27-29 under 35 U.S.C. § 112, ¶ 1, because the subject matter of these claims was allegedly not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, the Office Action contended that the specification discloses only a single species of hydroperoxide lyase (SEQ ID NO:7), which is asserted to be insufficient to describe hydroperoxide lyases as recited in the claims.

Applicants respectfully submit that the disclosure of the lyases in the specification plus the teachings of variants thereof and of highly conserved regions in lyases are a sufficient disclosure to prove Applicants are in possession of the invention. Applicants have described a hydroperoxide lyase in SEQ ID NO:7 and variants thereof in SEQ ID NO:15. Moreover, the

skilled microbiologist is taught how to modify the sequences to make additional variants. The specification (at page 12-14) gives the skilled artisan a clear instruction of how to prepare possible variants of the disclosed sequences. On page 12, line 8, of the present specification it is written:

It is understood that the disclosed lyase includes functional variants. These variants are produced by making amino acid substitutions, deletions, and insertions, as well as post translational modifications. Such variations may arise naturally as allelic variations (*e.g.*, due to genetic polymorphism) or may be produced by human intervention [etc.].

Further down, the specification discloses the specific procedures with which these modifications can be made. Table 2 (pages 13-14) teaches conservative amino acid substitutions for SEQ ID NO:7 and sets forth how these amino acids may be replaced. Figure 1 also shows the highly conserved domains, which one of skill in the art could use to prepare variants.

It should be noted that structure of biological molecule is not required to satisfy the written description requirement. In *Enzo II*, (*i.e.*, *Enzo Biochem v. Gen-Probe, Inc.*, 323 F.3d 956, 964 (Fed. Cir. 2002), the Federal Circuit explicitly referred to the Written Description Guidelines to state that:

[T]he written description requirement can be met by “showing that an invention is complete by disclosure of sufficiently detailed, relevant identifying characteristics...*i.e.*, complete or partial structure, other physical and/or chemical properties, *functional characteristics when coupled with a known or disclosed correlation between function and structure*, or some combination of such characteristics.” Guidelines, 66 Federal Register at 1106 (emphasis added).

Applicants teach several variants, highly conserved regions, conservative amino acid substitutions, specific lyase functions, and characteristics for the claimed invention. Specifically, as shown on page 1106 of the “Guidelines for Examination of Patent Applications under the 35 U.S.C. § 112, ¶ 1” (Federal Register Vol. 66, No. 4):

Factors to be considered in determining whether there is sufficient evidence of possession include the level of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with known or disclosed correlation between structure and function, and the method of making the claimed invention. Disclosure of any combination of such identifying characteristics that distinguish the claimed invention from other materials and would lead one of skill in the art to the conclusion that the applicant was in possession of the claimed species is sufficient.

Applicants have provided sufficient written description of the claimed lyases.

The Office Action also rejected claims 20-24 and 26-29 under 35 U.S.C. § 112, ¶ 1, alleging that the specification does not enable any person skilled in the art to make and use the invention commensurate in scope with the claims. It is respectfully submitted that the inventors of the present invention have been the first to discover hydroperoxide lyases having properties as recited in the present claims; indeed, this has already been acknowledged by the USPTO when granting US Patent 6,271,018. That is, with the presumption of validity, the nucleic acids that encode hydroperoxide lyases with the recited properties are considered to be enabled. It follows then that the encoded the lyases themselves are also enabled.

Enablement requires that the specification describe how to make and use the invention. The invention that must be enabled is defined by the claim(s). MPEP 2164

The skilled microbiologists, having the information of the specification, is instructed how to prepare natural and non-natural variants of SEQ ID NO:7 (*see e.g.*, SEQ ID NO:15), and thus to have more than only one specimen fulfilling the requirements of the hydroperoxide lyases used in the methods recited in the claims. Such experimentation is routine in the art.

Further, the indications of K_m and V_{max} , as recited in the claims to characterize the hydroperoxide lyase, are known to the skilled artisan working with enzymes. In fact, these values are key properties for characterizing enzymes in general and can be routinely determined in a clear and unambiguous way. The skilled artisan would thus be able to immediately determine if a specific hydroperoxide lyase possessed the properties as recited in the claims.

Moreover, as described above, the specification teaches several variants and how to make and use other variants.

The Office Action also asserted that knowledge regarding the biological source of such lyase and methods for redesigning the protein of SEQ ID NO:7 around 7-15 amino acids, and the three dimensional structure of SEQ ID NO:7 is lacking.

In regard to the biological source, the specification discloses an ample source of the enzyme of the present invention, readily available to everybody and commercially available in every super-market. (*See* page 24, lines 17-18; the specification discloses muskmelon (*Cucumis melo*) as an easy available biological source of the enzyme of the present invention.) And, as discussed above, the specification contains enough information for the skilled microbiologist to produce further variants of the disclosed SEQ ID NO:7 and SEQ ID NO:15. The specification

even provides additional guidance by describing various unique regions of the disclosed lyases (*see e.g.*, SEQ ID NOS:1-6).

Furthermore, the present invention relates to a method of making and using a claimed lyase. The USPTO has already considered patentable the family of hydroperoxide lyases having the recited properties (*see* US Patent 6,271,018).

Rejection under 35U.S.C. § 112, ¶ 2

The Office Action rejected claims 20-31 under 35 U.S.C. § 112, ¶ 2, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, the Office Action asserted that claims 20 and 21 are generally narrative and confusing, failing to conform to US practice. Applicants are unclear as to the nature of this rejection. Claims 20 and 21 recite a method as well as the steps for performing that method. Applicants cannot identify any “narrative” elements in the claims. However, in light of the amendments to claims 20 and 21, the Examiner is invited to reconsider. If the Examiner’s position remains unchanged, further clarification of this rejection is requested.

As for claims 25 and 30, the claims are alleged to be indefinite because they do not identify the lyase with a sequence identification number. By the amendment herein, claims 25 and 30 recite the sequence identification number of the lyase. Thus, Applicants believe the rejection is overcome.

CONCLUSIONS

In light of the foregoing amendments and remarks, it is believed that the objections and rejections presented in the Office Action have been overcome. Accordingly, Applicants respectfully submit that the Application is allowable and seek notification of same.

A Form PTO-2038 authorizing payment by credit card in the amount of \$392.00 is enclosed. This fee covers the \$216.00 fee for the twelve (12) additional claims over twenty

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(\$18.00 x 12) and the \$176.00 fee for the two additional independent claims. No additional fees are believed to be due; however, the Commissioner is hereby authorized to charge any fees which may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

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I hereby certify that this correspondence, and anything indicated as attached or included, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop AMENDMENT, Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450, on the date shown below.


Christopher L. Curfman

November 8, 2004
Date